# Bochang Moon

Assistant Professor

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## Education

- **Ph.D.** in Computer Science, KAIST, Korea — Feb. 2010 – Aug. 2014
  Thesis: Acceleration Techniques for Monte Carlo Ray Tracing
  Advisor: Sung-Eui Yoon
- **M.S.** in Computer Science at KAIST, Korea — Feb. 2008 – Jan. 2010
  Thesis: Cache-Oblivious Ray Reordering
  Advisor: Sung-Eui Yoon
- **B.S.** in Computer Science at Chung-Ang university, Korea — Mar. 2004 – Feb. 2008
  Graduated top of the college of engineering (GPA: 4.35/4.50)

## Professional Experience

- **Assistant Professor**, Gwangju Institute of Science and Technology — Sep. 2016 - present
- **Post Doc,** Disney Research Zürich (based on Edinburgh) — Nov. 2014 – July 2016
- **Post Doc**, Dept. of Computer Science, KAIST — Sep. 2014 – Oct. 2014
- **Research Intern**, Adobe, US — Jun. 2011 – Sep. 2011
- **Research Assistant**, Scalable Graphics/Geometric Algorithm Lab., KAIST — Feb. 2008 – Aug. 2014
- **Teaching Assistant**, Dept. of Computer Science, KAIST — Feb. 2009 – Jan. 2011

## Research Interests

- Denoising
- Cache-coherent algorithms for ray tracing
- Sampling and reconstruction for Monte Carlo ray tracing
- Photorealistic rendering for augmented and virtual reality

## Awards

- Significant New Researcher Award at Korea Computer Graphics Society 2014
- 3rd place at ACM Student Research Competition (SRC) Grand Finals held at ACM Awards Banquet

1st place at ACM SRC held at ACM SIGGRAPH 2009

RACBVHs: Random-Accessible Compressed Bounding Volume Hierarchies

Tae-Joon Kim, Bochang Moon, Duksu Kim, Sung-Eui Yoon

## Publications (International Conference / Journal papers)

1. **Noise Reduction on G-Buffers for Monte Carlo Filtering**

   Bochang Moon, Jose A Iglesias-Guitian, Steven McDonagh, Kenny Mitchell

   *Computer Graphics Forum (Presented at Eurographics Symposium on Rendering 2017), 2017*

2. **Pixel History Linear Models for Real-Time Temporal Filtering**

   Jose A Iglesias-Guitian, Bochang Moon, Charalampos Koniaris, Eric Smolikowski, Kenny Mitchell

   *Computer Graphics Forum (Proceedings of Pacific Graphics 2016), vol. 35, no. 7, pp. 363-372, Oct. 2016*

3. **Nonlinearly Weighted First-order Regression for Denoising Monte Carlo Renderings**

   Benedikt Bitterli, Fabrice Rousselle, Bochang Moon, Jose A. Iglesias-Guitian, David Adler, Kenny Mitchell, Wojciech Jarosz, Jan Novak

   *Computer Graphics Forum (Proceedings of Eurographics Symposium on Rendering 2016), vol. 35, no. 4, July 2016*

4. **User, Metric, and Computational Evaluation of Foveated Rendering Methods**

   Nicholas T. Swafford, Charalampos Koniaris, Jose A. Iglesias-Guitian, Bochang Moon, Darren Cosker, Kenny Mitchell

   *Proceedings of ACM Symposium on Applied Perception, July 2016*

5. **Adaptive polynomial rendering**

   Bochang Moon, Steven McDonagh, Kenny Mitchell, Markus Gross

   *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2016), vol. 35, no. 4, pp. 40:1-40:10, July 2016*

6. **Adaptive rendering with linear predictions**

   Bochang Moon, Jose A. Iglesias-Guitian, Sung-Eui Yoon, Kenny Mitchell

   *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2015), vol. 34, no. 4, pp. 121:1-121:11, Aug. 2015*

7. **Recent advances in adaptive sampling and reconstruction for Monte Carlo rendering**

   Matthias Zwicker, Wojciech Jarosz, Jaakko Lehtinen, Bochang Moon, Ravi Ramamoorthi, Fabrice Rousselle, Pradeep Sen, Cyril Soler, Sung-Eui Yoon

   *Computer Graphics Forum (Proceedings of Eurographics 2015), vol. 34, no. 2, pp. 667-681, May 2015*

8. **Adaptive rendering based on weighted local regression**

   Bochang Moon, Nathan Carr, Sung-Eui Yoon

   *ACM Transactions on Graphics (Presented at SIGGRAPH 2015), vol. 33, no. 5, pp. 170:1-170:14, Aug. 2014*

9. **P-RPF: pixel-based random parameter filtering for Monte Carlo rendering**

   Hyosub Park, Bochang Moon, Soomin Kim, Sung-Eui Yoon

   *Proceedings of Computer-Aided Design and Computer Graphics (CAD/Graphics), pp. 123 - 130, Nov. 2013*

10. **Robust image denoising using a virtual flash image for Monte Carlo ray tracing**

    Bochang Moon, Jong Yun Jun, JongHyeob Lee, Kunho Kim, Toshiya Hachisuka, Sung-Eui Yoon

    *Computer Graphics Forum (Presented at Eurographics Symposium on Rendering 2014), vol. 32, No. 1, pp. 139-151, Feb. 2013*

11. **Cache-oblivious ray reordering**

Bochang Moon, Youngyong Byun, Tae-Joon Kim, Pio Claudio, Hye-sun Kim, Yun-ji Ban, Seung Woo Nam, Sung-Eui Yoon

*ACM Transactions on Graphics (Presented at SIGGRAPH 2011), vol. 29, no. 3, pp. 28:1-28:10, June 2010*

12. **HCCMeshes: hierarchical-culling oriented compact meshes**

    Tae-Joon Kim, Yongyoung Byun, Yongjin Kim, Bochang Moon, Seungyong Lee, Sung-Eui Yoon

    *Computer Graphics Forum (Proceedings of Eurographics 2010), vol. 29, no. 2, pp. 299-308, May 2010*

13. **RACBVHs: random-accessible compressed bounding volume hierarchies**

    Tae-Joon Kim, Bochang Moon, Duksu Kim, Sung-Eui Yoon

    *IEEE Transactions on Visualization and Computer Graphics, vol. 16, no. 2, pp. 273-286, Mar. 2010*

## Presentations (Short Papers/Posters/Exhibitions)

1. **Interactive Ray-Traced Area Lighting with Adaptive Polynomial Filtering**

   Jose A. Iglesias Guitian, Bochang Moon, Kenny Mitchell

   The 13th European Conference on Visual Media Production (CVMP), London, 2016

2. **IRIDiuM: Immersive Rendered Interactive Deep Media**

   Babis Koniaris, Maggie Kosek, Ivan Huerta, Karen Darragh, Charles Malleson, Joanna Jamrozy, Nick Swafford, Jose A. Iglesias Guitian, Bochang Moon, Ali Israr, Kenny Mitchell

   VR Village in SIGGRAPH 2016

## Domestic Publications

1. **SURE-based-Trous Wavelet Filter for Interactive Monte Carlo Rendering**

   Soomin Kim, Bochang Moon, Sung-Eui Yoon

   Journal of KIISE, vol. 43, no. 8, pp. 835-840, Aug. 2016

## Invited Talks

1. **Local Regression based Denoising for Ray Tracing**
   a. Korea Computer Graphics Society, July 12, 2017
   b. KwangWoon University, Mar. 16, 2017
   c. KAIST, Aug. 16, 2016

## Patents

1. **Adaptive sampling guided by multilateral filtering**

   Bochang Moon, Nathan Carr

   Registration #: 08824834, US, 02 Sep. 2014

2. **Method for removing image noise on basis of stochastic rendering**

   Sung-Eui Yoon, Bochang Moon, Kunho Kim, Jong Yun Jun, Jong Hyeob Lee

   Publication #: WO/2013/137522, PCT, 19 Sep. 2013

3. **Noise reduction method for stochastic rendering image**

   Sung-Eui Yoon, Bochang Moon, Kunho Kim, Jong Yun Jun, Jong Hyeob Lee

Registration #: 1012827000000, Korea, 01 July 2013

## Professional Activities

- Associate Editor
  - Visual Computer, Sep. 2016 - present
- Program Committee
  - EGSR 2017, KCGS 2017
- Reviewer
  - ACM SIGGRAPH, ACM SIGGRAPH ASIA, ACM Transactions on Graphics, IEEE TVCG, Pacific Graphics, Visual Computer, ACM TOPLAS, ETC.

## Press Release

- "Disney Research rendering method preserves detail in film quality production graphics"
  - Phys, Aug. 5, 2015, http://phys.org/news/2015-08-team-method-quality-production-graphics.html
- "Adaptive rendering method reduces discolored pixels in photo-realistic images"
  - Phys, July 20, 2016, https://phys.org/news/2016-07-method-discolored-pixels-photo-realistic-images.html

## Research Grants / Contracts

**Ongoing projects**

1. Photo-Realistic Rendering in Augmented Reality
   - 2017.12-2020.11, PI, Samsung, 450M won ($450K)
2. Developed intelligent UXUI technology for AR glasses-based docent operation
   - 2017.04-2017.12, MCST, 30M won ($30K)
3. 3D Indoor Reconstruction and Its Applications
   - 2017.05-2017.12, PI, GIST, approximately 60M won ($60K)
4. Denoising for Physically based Rendering
   - 2017.03 – 2020.02, PI, NRF, 225M won ($225K)
5. Optimization Techniques for Photorealistic Rendering
   - 2016.09 – 2018.08, PI, GIST seed grant, 70M won ($70K)
6. Startup funding
   - 2016.09 – 2018.12, PI, GIST seed grant, 130M won ($130K)

**Past projects**

7. Denoising Techniques for Monte Carlo Ray Tracing
   - 2016.09 – 2016.12, PI, GIST, 19M won ($19K)

## Teaching

- Introduction to Computer Graphics (3 credits)
  - Spring 2017
- Photorealistic Rendering (3 credits)
  - Fall 2017
- Culture Technology Program Seminar (1 credit)
  - Spring 2017, Fall 2017
- Character Design, Animation, and Rendering (KMOOC course)
  - 2017

## Supervised Students

- Ph.D. Course
- M.S./Ph.D. Integrated Course
  - Piljoon Jeong (정필중, 2017.09 – present)
- M.S. Course
  - Saerom Ha (하새롬, 2017.03 – present), Sojin Oh (오소진, 2017.08 – present), Prajita Mane (2017.09 - present)
- Intern
  - Sunhwa Kim (김선화, 2017.02), Jae-Yee Kim (김재이, 2017.07-2017.08)

## Dissertation Committee for M.S. and Ph.D. Students

- MS committee
  - Yonghoon Kwon (권용훈, advisor: Kuk-Jin Koon, 2017.06), Yunjeong Choi (최윤정, advisor: Jeha Ryu, 2016.12), Jae-Won Ye (예재원, advisor: Kuk-Jin Yoon, 2016.12)